CLAIMS

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1. A combustion apparatus comprising:

a cylindrical combustion chamber;

an air supply portion for supplying combustion air into said combustion chamber; and

a fuel supply portion for supplying fuel into said combustion chamber,

wherein a flow of the combustion air supplied into said combustion chamber first crosses a track of the fuel supplied into said combustion chamber at a region away from said fuel supply portion and then crosses the track of the supplied fuel again at a region near said fuel supply portion.

2. The combustion apparatus as recited in claim 1, wherein said fuel supply portion is configured so as to form a flow of the fuel with a velocity component in a direction of a central axis of said combustion chamber and a velocity component in a direction from the central axis of said combustion chamber to a wall surface of said combustion chamber,

wherein said air supply portion is configured so as to form a flow of the combustion air with a velocity component in a direction opposed to the direction of the fuel with respect to the direction of the central axis of said combustion chamber and a velocity component to swirl in a circumferential direction.

3. The combustion apparatus as recited in claim 2, wherein the flow of the fuel has a velocity component in the direction of an outlet of said combustion apparatus,

wherein the flow of the combustion air has a velocity component in a direction opposite to the direction of the outlet.

4. A combustion apparatus comprising:

a cylindrical container having a close end and an open end;

an inflow passage for supplying combustion air into a combustion chamber in said cylindrical container, said inflow passage being formed at a location away from said close end in a direction of a central axis of said cylindrical container so as to extend through a side surface of said cylindrical container; and

a fuel nozzle provided inside of said close end of said cylindrical container for supplying fuel into said combustion chamber in said cylindrical container,

wherein said inflow passage is configured so as to form a flow of the air with a velocity component in the direction of the central axis of said cylindrical container from said open end to said close end and a velocity component to swirl in a circumferential direction of said cylindrical container,

wherein said fuel nozzle is configured so as to inject the fuel toward said inflow passage with a velocity component in the direction of the central axis of said cylindrical container from said close end to said open end and a velocity component directed radially outward.

5. A combustion apparatus comprising:

a cylindrical container having a close end and an open end;

an inflow passage for supplying combustion air into a combustion chamber in said cylindrical container; and

a fuel nozzle for supplying fuel into said combustion chamber in said cylindrical container,

wherein said cylindrical container has a portion having a reduced diameter at a location away from said close end along a central axis of said cylindrical container by a predetermined distance,

wherein said inflow passage is formed at said portion having a reduced diameter in said cylindrical container and is configured so as to form a flow of the air with a

velocity component in the direction of the central axis of said cylindrical container from said open end to said close end and a velocity component to swirl in a circumferential direction of said cylindrical container,

wherein said fuel nozzle is configured so as to inject the fuel toward said inflow passage with a velocity component in the direction of the central axis of said cylindrical container from said close end to said open end and a velocity component directed radially outward.

6. A combustion apparatus comprising:

a cylindrical container having a close end and an open end;

a cylindrical member disposed substantially coaxially with a central axis of said cylindrical container and positioned on said open end side, said cylindrical member having a diameter smaller than that of said cylindrical container;

an annular connecting member connecting said open end of said cylindrical container and an outer circumferential surface of said cylindrical member to each other;

an inflow passage formed in said connecting member for supplying combustion air into said combustion chamber in said cylindrical container; and

a fuel nozzle provided inside of said close end of said cylindrical container for supplying fuel into said combustion chamber in said cylindrical container,

wherein said inflow passage is configured so as to form a flow of the air with a velocity component in the direction of the central axis of said cylindrical container from said open end to said close end and a velocity component to swirl in a circumferential direction of said cylindrical container,

wherein said fuel nozzle is configured so as to inject the fuel toward said inflow passage with a velocity component in the direction of the central axis of said cylindrical container from said close end to said open end and a velocity component directed radially outward.

7. The combustion apparatus as recited in any one of claims 4 through 6, wherein a second inflow passage is provided on a side surface of said cylindrical container near said close end for supplying air inwardly in a radial direction of said cylindrical container.

8. The combustion apparatus as recited in any one of claims 4 through 7, wherein a flow adjusting structure is provided on said close end within said cylindrical container and/or on a side wall near said close end for suppressing a flow of the air swirling in a circumferential direction of said cylindrical container with a velocity component in the central axis of said cylindrical container from said open end to said close end in a region near said close end.

9. The combustion apparatus as recited in claims 4 through 8, wherein a flow adjusting structure is provided on said close end within said cylindrical container and/or on a side wall of said cylindrical container near said close end for converting a flow of air having a velocity component in a direction of the central axis of said cylindrical container from said open end to said close end and swirling in a circumferential direction of said cylindrical container into a flow directed inwardly in a radial direction near said close end.

10. The combustion apparatus as recited in claims 4 through 9, wherein an additional fuel nozzle is provided at a location closer to said close end than said inflow passage with respect to the direction of the central axis of said cylindrical container.

11. A combustion method of supplying combustion air and fuel into a combustion chamber in a combustion apparatus, and mixing and combusting the combustion air and the fuel,

wherein a track of an air flow and a track of a fuel flow are not the same in said combustion chamber,

wherein the track of the air flow first crosses the track of the fuel flow at a region near a tip of the track of the fuel flow and then crosses the track of the fuel flow again at a region from a root of the track of the fuel flow to a vicinity of the tip.

12. The combustion method as recited in claim 11, wherein the fuel flow has a velocity component in a direction of a central axis of said combustion chamber and a velocity component in a direction from the central axis of said combustion chamber to a wall surface of said combustion chamber,

wherein the air flow has a velocity component in a direction opposed to the direction of the fuel with respect to the direction of the central axis of said combustion chamber and a velocity component to swirl in a circumferential direction.